

What is claimed is:

1. A device for controllably attenuating an optical signal comprising:
  - a waveguide including a core having a first refractive index and a cladding comprising a material with a second refractive index and an electro-optical (EO) material having a first side adjacent to said core and a second side distal from said core;
  - a pair of electrodes to produce an electric field within said EO material and change the refractive index of said EO material; and
  - a layer adjacent to said second side of said EO material and having a refractive index approximately equal to said first refractive index;where the proportion of light transmitted through said waveguide varies with the voltage applied to said pair of electrodes, and  
where at least a portion of incident waveguide not transmitted through said waveguide is transmitted along said layer.
2. The device of claim 1, wherein the refractive index of said EO material varies with said applied voltage difference from said first refractive index to said second refractive index.
3. The device of claim 1, further including a substrate, and wherein said first material is on said substrate.
4. The device of claim 1, further including a sensor, and wherein said layer is optically coupled to said sensor to produce an output proportional to the light transmitted along said layer.
5. The device of claim 4, further including a controller for controlling said applied voltage difference in response to said output.
6. The device of claim 2, further including a substrate, wherein said first material is on said substrate, wherein said layer has a side distal from said EO material, and wherein one of said pair of electrodes is between said substrate and said first material, and wherein the other of said pair of electrodes is adjacent said layer distal side.
7. The device of claim 2, wherein each of said pair of electrodes are coplanar and parallel with said waveguide, wherein each of said pair of electrodes has an edge, wherein the pair of edges has a spacing, and wherein at least a portion of said EO material is between said pair of edges.
8. The device of claim 7, wherein said spacing is a regularly repeating spacing along said waveguide.

9. The device of claim 8, wherein the spacing repeats step-wise between a first spacing having a first longitudinally extent and a second spacing having a second longitudinal extent.
10. An array of devices for controllably attenuating a plurality of optical signal comprising: a plurality of spaced waveguides, where each waveguide comprises
- a core having a first refractive index and a cladding including a material having a second refractive index and an electro-optical (EO) material having a first side adjacent to said core and a second side distal from said core;
  - a plurality of pair of electrodes each corresponding to one of said plurality of waveguides, where each pair of electrodes produces an electric field within said EO material and changes the refractive index of said EO material of said corresponding one of said plurality of waveguides; and
  - a plurality of layers each corresponding to one of said plurality of waveguides, where each layer is adjacent to said corresponding second side of said EO material and has a refractive index approximately equal to said first refractive index;
- where, for each of said plurality of waveguides, the proportion of light transmitted through said waveguide varies with the voltage applied to said pair of electrodes, and
- where, for each of said plurality of waveguides, at least a portion of incident waveguide not transmitted through said waveguide is transmitted along said corresponding layer.
11. The device of claim 10, wherein the refractive index of said EO material varies with said applied voltage difference from said first refractive index to said second refractive index.
12. The device of claim 10, further including a substrate, and wherein said first material is on said substrate.
13. The device of claim 10, further including a plurality of sensors, and wherein each of said plurality of layers is optically coupled to one of said plurality of sensors to produce an output proportional to the light transmitted along said corresponding layer.
14. The device of claim 13, further comprising a controller for controlling said applied voltage difference to each of said plurality of electrodes in response to said corresponding output.
15. The device of claim 11, further including a substrate, wherein said first material is on said substrate, wherein one of each of said pair of electrodes is between said substrate and said first material, and wherein the other of each of said pair of electrodes is adjacent said layer distal side.

16. The device of claim 11, wherein each of said pair of electrodes are coplanar and parallel with said waveguide, wherein each of said pair of electrodes has an edge, wherein the pair of edges has a spacing, and wherein at least a portion of said EO material is between said pair of edges.

17. The device of claim 16, wherein said spacing is a regularly repeating spacing along said waveguide.

18. The device of claim 17, wherein the spacing repeats step-wise between a first spacing having a first longitudinally extent and a second spacing having a second longitudinal extent.